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AQUATIC INVERTEBRATES AND HABITAT AT A FIXED STATION ON THE BIGHORN RIVER, TREASURE COUNTY, MONTANA

July 25, 2001

A report to
the Montana Department of Environmental Quality
Helena, Montana

by

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May 2002

INTRODUCTION

This report is one of 38 brief interpretive summaries of data assembled as part of a statewide, multi-year study conducted by the Montana Department of Environmental Quality (MT DEQ). Each report discusses information generated from a single benthic invertebrate sample collection and habitat evaluation at a fixed station established on a gauged river or high-order tributary. The present treatise focuses on the aquatic community sampled on the Bighorn River at Bighorn, Montana on July 25, 2001. The sample site was located by GPS reading at ~~49~~ 46° 08' 32" N, 107° 28' 02" W, lying within the Northwestern Great Plains Ecoregion (Woods et al. 1998). The sample was collected by personnel of MT DEQ. Sampling effort consisted of either a composite of four Hess samples, or a one-minute kicknet collection (Bukantis 1998). Habitat parameters were evaluated using the MT DEQ Macroinvertebrate Habitat Assessment Field Form for streams with riffle/run prevalence. Invertebrate samples were processed and animals identified by Rhithron Associates, Inc. Analysis of invertebrate assemblages was accomplished by applying the method recommended by Bukantis (1998) for streams of Montana's Plains ecoregions. The method uses a multimetric battery to evaluate disturbance to biotic integrity. Results from the application of other metric batteries may be found in the Appendix.

RESULTS AND DISCUSSION

Table 1 itemizes the evaluated habitat parameters and shows the assigned scores for each, as well as the integrated score and condition category.

Overall habitat conditions scored sub-optimally at this site on the Bighorn River. Colonization potential of the benthic substrate was judged sub-optimal, and some degree of sediment deposition was observed. Pools were less variable than expected. Flow conditions were rated marginal. Streambanks were perceived to be moderately stable.

Table 1. Stream and riparian habitat assessment for a fixed station on the Bighorn River . July, 2001

Max. possible score	**Parameter**	Bighorn River at Bighorn
20	Bottom substrate	12
20	Pool substrate char.	16
20	Pool variability	9
20	Channel alteration	14
20	Sediment deposition	14
20	Channel sinuosity	8
20	Channel flow status	10
20	Bank vegetation	9 / 9
20	Bank stability	6 / 6
20	Vegetated zone	8 / 9
200	Total	130
	Percent of maximum CONDITION*	**65** **SUB-OPTIMAL**

*Condition categories: Optimal (OPT) > 80% of maximum score, Sub-optimal (SUB) ; 75 - 56%. Marginal (MARG) 49 - 29%; Poor <23%. Adapted from Plafkin et al. 1998.

Table 2. Metric values, scores, and bioassessment for a fixed station on the Bighorn River . The Montana DEQ bioassessment metric battery recommended for streams of the Plains ecoregions (Bukantis 1998) was used for the evaluation. July 2001.

	Bighorn River at Bighorn	
METRICS	**METRIC VALUES**	**METRIC SCORES**
Taxa richness	37	3
EPT richness	17	3
Biotic index	4.68	3
% Dominant taxon	22.05	3
% Collectors	81.99	1
% EPT	72.05	3
Shannon diversity	3.65	3
% Scrapers and Shredders	12.11	1
Predator taxa	6	3
% Multivoltine	23.29	3
	TOTAL SCORE (max.=30)	26
	PERCENT OF MAX.	87
	Impairment classification	**NON-IMPAIRED**
	USE SUPPORT	**FULL**

Bioassessment results are given in Table 2. When this bioassessment method is applied to these data, scores indicate that this site on the Bighorn River is non-impaired and fully supports designated uses.

An extremely rich mayfly fauna was the most remarkable feature of the sampled assemblage. The biotic index value (4.68) was within expectations for a riverine environment; water quality at this site was likely very good.

Diverse and abundant habitats appeared to be available, since taxa richness was very high (37) and predators were represented by 6 taxa. Fifteen “clinger” taxa were collected, suggesting that fine sediment deposition did not compromise hard substrate habitats. However, the presence of soft sediment habitats was indicated by the burrowing mayfly *Hexagenia limbata* and a few midges usually associated with such niches, notably *Microtendipes* sp. and *Cryptochironomus* sp.

The functional structure of the assemblage was dominated by gatherers, which corresponds with the dominance of mayflies in the taxonomic structure.

CONCLUSIONS

- The rich benthic fauna and relatively high community sensitivity suggest that water quality and habitat quality were both good at this site.
- The bioassessment method used here appears to give an accurate evaluation of biotic health.

LITERATURE CITED

Bukantis, R. 1998. Rapid bioassessment macroinvertebrate protocols: Sampling and sample analysis SOP's. Working draft, April 22, 1997. Montana Department of Environmental Quality. Planning Prevention and Assistance Division. Helena, Montana.

Woods, A.J., Omernik, J. M. Nesser, J.A., Shelden, J., and Azevedo, S. H. 1999. Ecoregions of Montana (Color poster with map, descriptive text, summary tables, and photographs) Reston, Virginia. US Geological Survey.

APPENDIX

Taxonomic data and summaries

Bighorn River

July 2001

Aquatic Invertebrate Taxonomic Data

Site Name: Bighorn River at Bighorn **Date: 7/25/01**
Site ID: Y17BIGH01 Approx. percent of sample used. 37

Taxon	Quantity	Percent	HBI	FFG
Dugesia sp.	3	0.93	4	PR
Nais variabilis	6	1.86	10	CG
Ophidonais serpentina	2	0.62	6	CG
Limnodrilus hoffmeisteri	22	6.83	10	CG
Ferrissia sp.	3	0.93	6	SC
Caecidotea sp.	1	0.31	8	CG
Total Misc. Taxa	**37**	**11.49**		
Acentrella insignificans	25	7.76	4	CG
Labiobaetis sp.	9	2.80	4	CG
Fallceon quilleri	19	5.90	5	CG
Brachycercus sp.	4	1.24	7	CG
Attenella margarita	1	0.31	2	CG
Hexagenia limbata	2	0.62	6	CG
Cinygma sp.	6	1.86	0	SC
Leucrocuta sp.	5	1.55	4	SC
Rhithrogena sp.	3	0.93	0	CG
Stenonema sp.	10	3.11	3.5	SC
Choroterpes sp.	38	11.80	2	CG
Tricorythodes minutus	71	22.05	4	CG
Total Ephemeroptera	**193**	**59.94**		
Claassenia sabulosa	1	0.31	3	PR
Total Plecoptera	**1**	**0.31**		
Sigara lineata	4	1.24	5	PH
Total Hemiptera	**4**	**1.24**		
Cheumatopsyche sp.	29	9.01	5	CF
Hydropsyche sp.	4	1.24	5	CF
Mayatrichia sp.	4	1.24	6	SC
Oecetis sp.	1	0.31	8	PR
Total Trichoptera	**38**	**11.80**		
Dubiraphia sp.	2	0.62	6	CG
Microcylloepus sp	10	3.11	5	SC
Ordobrevia sp.	4	1.24	5	CG
Total Coleoptera	**16**	**4.97**		
Hemerodromia sp.	2	0.62	6	PR
Simulium sp.	3	0.93	5	CF
Total Diptera	**5**	**1.55**		
Corynoneura sp	1	0.31	7	CG
Cricotopus (Isocladius) Gr	1	0.31	7	CG
Cryptochironomus sp	1	0.31	8	PR
Microtendipes sp	10	3.11	6	CF
Polypedilum sp.	1	0.31	6	SH
Rheocricotopus sp	3	0.93	4	CG
Tanytarsus sp	4	1.24	6	CF
Thienemannimyia Gr	7	2.17	5	PR
Total Chironomidae	**28**	**8.70**		
Grand Total	**322**	**100.00**		

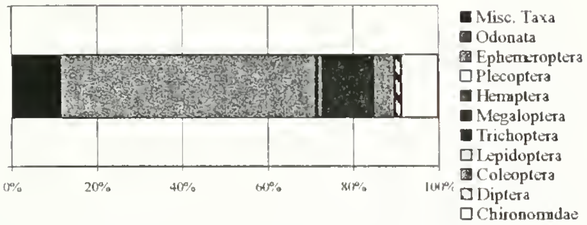
Aquatic Invertebrate Summary

Site Name: Bighorn River at Bighorn **Date: 7/25/01**

SAMPLE TOTAL	322
EPT abundance	232
TAXA RICHNESS	37
Number EPT taxa	17
Percent EPT	72 05

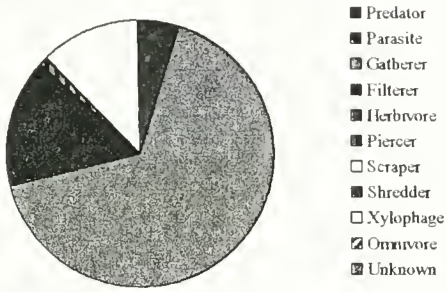
TAXONOMIC COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Misc Taxa	11 49	6	37
Odonata	0 00	0	0
Ephemeroptera	59 94	12	193
Plecoptera	0 31	1	1
Hemiptera	1 24	1	4
Megaloptera	0 00	0	0
Trichoptera	11 80	4	38
Lepidoptera	0 00	0	0
Coleoptera	4 97	3	16
Diptera	1 55	2	5
Chironomidae	8 70	8	28



FUNCTIONAL COMPOSITION

GROUP	PERCENT	#TAXA	ABUNDANCE
Predator	4 66	6	15
Parasite	0 00	0	0
Gatherer	66 46	18	214
Filterer	15 53	5	50
Herbivore	0 00	0	0
Piercer	1 24	1	4
Scraper	11 80	6	38
Shredder	0 31	1	1
Xylophage	0 00	0	0
Omnivore	0 00	0	0
Unknown	0 00	0	0



COMMUNITY TOLERANCES

Sediment tolerant taxa	3
Percent sediment tolerant	29 81
Sediment sensitive taxa	0
Percent sediment sensitive	0 00
Metals tolerance index (McGuire)	3 67
Cold stenotherm taxa	1
Percent cold stenotherms	1 86

Site ID: Y17BIGH01

DOMINANCE

TAXON	ABUNDANCE	PERCENT
Tricorythodes minutus	71	22 05
Choroterpes sp	38	11 80
Cheumatopsyche sp	29	9 01
Acentrella insignificans	25	7 76
Limnodrilus hoffmeisteri	22	6 83
SUBTOTAL 5 DOMINANTS	185	57 45
Fallceon quilleri	19	5 90
Stenonema sp	10	3 11
Microcylloepus sp	10	3 11
Microtendipes sp	10	3 11
Labiobaetis sp	9	2 80
TOTAL DOMINANTS	243	75 47

SAPROBITY

Hilsenhoff Biotic Index	4 68

DIVERSITY

Shannon H (loge)	2 53
Shannon H (log2)	3 65
Simpson D	0 08

VOLTINISM

TYPE	ABUNDANCE	PERCENT
Multivoltine	75	23 29
Univoltine	229	71 12
Semivoltine	18	5 59

TAXA CHARACTERS

	#TAXA	ABUNDANCE	PERCENT
Tolerant	10	167	51 86
Intolerant	1	6	1 86
Clinger	15	87	27 02

BIOASSESSMENT INDICES

B-IBI (Karr et al.)

METRIC	VALUE		SCORE	
Taxa richness	37		3	
E richness	12		5	
P richness	1		1	
T richness	4		1	
Long-lived	4		3	
Sensitive richness	1		1	
%tolerant	51 86		1	
%predators	4 66		1	
Clinger richness	15		3	
%dominance (3)	42 86		5	
		TOTAL SCORE	24	48 %

MONTANA DEQ METRICS (Bukantis 1998)

METRIC	VALUE	Plains Ecoregions	Valleys and Foothills	Mountain Ecoregions
Taxa richness	37	3	3	3
EPT richness	17	3	3	2
Biotic Index	4 68	3	2	1
%Dominant taxon	22 05	3	3	3
%Collectors	81 99	1	1	0
%EPT	72 05	3	3	3
Shannon Diversity	3 65	3		
%Scrapers +Shredd	12 11	1	1	0
Predator taxa	6	3		
%Multivoltine	23 29	3		
%H of T	86 8		1	
TOTAL SCORES		26	17	12
PERCENT OF MAXIMUM		86 67	70 83	57 14
IMPAIRMENT CLASS		NON	SLIGHT	SLIGHT